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AND ENVIRONMENT

MINISTERE DES AFFAIRES MUNICIPALES
ET DE L'ENVIRONNEMENT

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SAINT JOHN AIR QUALITY DATA

1987 ANNUAL REPORT

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EXECUTIVE SUMMARY

This report summarizes ambient air quality data and monitoring activity in the Greater Saint John area for 1987. Using the IQUA long term rating system that has been applied to cities across Canada, Saint John air quality is described as GOOD for the year. In Part 3 of this report, some twelve years of monitoring data are summarized. Rather significant improvement with respect to locally produced pollutants has occurred.

However, Saint John is an industrial city where new industry and expanded production at existing facilities must always be anticipated. The monitoring system continues to be modified to more efficiently assess these anticipated trends.

Odors are a significant cause of complaints. While an effective continuous odor monitor has not yet been developed, an improved hydrogen sulphide monitor has been introduced and operates in West Saint John.

The Saint John Region geographically lies down-wind of the large industrial areas located to the west and soutwest and is in receipt of acidic precipitation. In Part 4 of this report, three years of precipitation chemistry data are presented.

Any questions or comments should be directed to the address on the cover sheet.

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ANNUAL REPORT

SAINT JOHN AIR QUALITY

1. INTRODUCTION

The Department of Municipal Affairs and Environment has operated an air quality monitoring network in Saint John since 1974. It includes a number of sampling locations linked by electronic telemetry to the Saint John Regional office on Prince Street.

Data return improved to an annual level of better than 85% for most parameters.

Site evaluation recommendations made in 1986 were implemented in 1987. The Forest Hills Station was moved in August to a new location considered to be more representative just up the hill from the original site. The TSP monitor at the District Tourist Bureau was moved to a more open area on the property.

As a result of a "fall-out" incident in the North End the TSP monitor was moved from the Millidgeville site to the Saint John Power Boat Club for a period of time. It was relocated at years end to the roof of the Saint John Regional Center.

The representativeness of data from the Millidgeville site was questioned and the site was re-evaluated. It was decided to drop this station from the network until a more suitable location could be found. The proposed relocation to Adelaide Street was postponed due to proposed construction for the area.

2. PRESENTATION OF DATA

2.1 General

The following tables present frequency distributions of hourly average readings, monthly and annual means, and the number of monthly and annual observations.

The number of exceedances of the hourly provincial standard (or federal acceptable guideline limit in the case of ozone) and the annual average concentrations are presented on Summary Tables for each station at the beginning of each of the following subsections.

The number of hourly samples taken should be noted before drawing any conclusions regarding monthly or annual averages. These averages are calculated based on all samples taken with no minimum number specified.

2.2

CENTRAL BLISSVILLE

SUMMARY

PARAMETER	SEASONAL AVERAGE	NUMBER OF 1 HOUR EXCEEDANCES
Ozone	33.6 ug/m^3	3

OZONE (PPHM)

**** FREQUENCY DISTRIBUTION ****

Month	0-01	02-05	06-08	09-12	13+	NO. OF SAMPLES	MONTHLY AVERAGE
June	0	12	1	0	0	13	2.9
July	255	325	1	0	0	581	1.6
Aug	288	399	50	3	0	740	2.2
Sept	519	189	12	0	0	720	1.2
Total	1062	925	64	3	0	2054	1.7

2.3

CHAMPLAIN HEIGHTS

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER OF 1 HOUR EXCEEDANCES
Sulphur Dioxide	14.6 ug/m^3	0

SULPHUR DIOXIDE (PPHM)

*** FREQUENCY DISTRIBUTION ***

Month	0-02	03-11	12-17	18-34	35+	NO. OF Samples	Monthly Average
JAN	597	35	6	2	0	640	0.6
FEB	624	17	3	0	0	644	0.3
MAR	593	24	5	1	0	623	0.5
APR	667	16	2	1	0	686	0.3
MAY	701	35	0	1	0	737	0.5
JUNE	659	28	1	0	0	688	0.6
JULY	673	69	1	0	0	743	0.8
AUG	698	43	2	0	0	743	0.7
SEPT	633	31	5	2	0	671	0.6
OCT	602	69	4	0	0	675	0.9
NOV	663	40	5	3	0	711	0.7
DEC	698	20	1	1	0	720	0.4
ANNUAL	7808	427	35	11	0	8281	0.6

2.4

FOREST HILLS

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER OF 1 HOUR EXCEEDANCES
Nitrogen Dioxide	19.6 ug/m^3	0
Ozone	45.2 ug/m^3	0
Sulphur Dioxide	19.9 ug/m^3	0
Total Suspended Lead	0.02 ug/m^3*	N/A
Total Suspended Particulate	45.6 ug/m^3*	1
Total Suspended Sulphate	3.60 ug/m^3*	N/A

* Annual Average expressed as a geometric mean

FOREST HILLS

NITROGEN DIOXIDE
(PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-2	03-05	06-10	11-21	22+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN.	254	187	12	0	0	453	2.3
FEB.	572	97	2	0	0	671	1.4
MAR	500	165	46	1	0	712	2.1
APR.	557	43	0	0	0	600	0.9
MAY	704	39	0	0	0	743	1.0
JUNE	687	30	0	0	0	717	1.0
JULY	725	17	0	0	0	742	1.1
AUG	579	4	0	0	0	583	0.6
SEPT	499	12	2	0	0	513	0.4
OCT	727	17	0	0	0	744	0.6
NOV	690	22	0	0	0	712	0.5
DEC	651	38	0	0	0	689	0.6
ANNUAL	71.5	671	62	1	0	7879	1.0

FOREST HILLS

OZONE
(PPHM)

**** FREQUENCY DISTRIBUTION ****

MONTH	0-1	02-05	06-08	09-12	13+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN	375	77	0	0	0	452	0.6
FEB	96	575	0	0	0	671	2.8
MAR	110	551	3	0	0	664	2.6
APR	95	505	0	0	0	600	2.6
MAY	80	650	12	0	0	742	2.9
JUNE	81	612	24	0	0	717	2.7
JULY	275	467	0	0	0	742	1.7
AUG	195	374	14	0	0	583	2.0
SEPT	105	427	7	0	0	539	2.3
OCT	156	588	0	0	0	744	2.3
NOV	169	543	0	0	0	712	2.1
DEC	104	585	0	0	0	689	2.5
ANNUAL	1841	5954	60	0	0	7855	2.3

FOREST HILLS

SULPHUR DIOXIDE
(PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-2	03-11	12-17	18-34	35+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN	300	13	0	0	0	313	0.6
FEB	660	11	0	0	0	671	0.4
MAR	684	28	0	0	0	712	0.7
APR	568	32	0	0	0	600	0.5
MAY	659	83	0	0	0	742	0.9
JUNE	599	116	2	0	0	717	1.0
JULY	591	147	4	0	0	742	1.5
AUG	492	90	1	0	0	583	1.2
SEPT	511	21	0	0	0	532	0.3
OCT	666	74	4	0	0	744	0.9
NOV	677	34	0	0	0	711	0.6
DEC	680	9	0	0	0	689	0.3
ANNUAL	7087	658	11	0	0	7756	0.8

FOREST HILLS

SUSPENDED PARTICULATE
(ug/m^3)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-30	31-60	61-90	91-120	120+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN	0	2	3	0	0	5	65.7
FEB	0	4	0	0	0	4	41.8
MAR	2	2	1	0	0	5	37.3
APR	3	1	1	0	0	5	32.6
MAY	1	1	2	1	0	5	52.1
JUNE	2	3	0	0	0	5	29.3
JULY	0	2	1	1	1	5	78.9
AUG	1	0	1	2	0	4	55.4
SEPT	1	1	1	1	0	4	40.0
OCT	1	4	0	0	0	5	35.9
NOV	0	3	2	0	0	5	50.8
DEC	0	3	2	0	0	5	49.8
ANNUAL	11	26	14	5	1	57	45.6

2.5

LEPREAU

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER OF 1 HOUR EXCEEDANCES
Ozone	44.8 ug/m^3	0

OZONE (PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-01	02-05	06-08	09-12	13+	NO. OF SAMPLES	MONTHLY AVERAGE
JULY	82	424	8	0	0	514	2.4
AUG	231	473	40	0	0	744	2.3
SEPT	136	222	8	0	0	366	2.0
ANNUAL	449	1119	56	0	0	1624	2.3

2.6

MILLEDGEVILLE

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER OF HOUR EXCEEDANCES
Total Suspended Lead	0.03 ug/m^3*	N/A
Total Suspended Particulate	51.4 ug/m^3*	1
Total Suspended Sulphate	3.89 ug/m^3*	N/A

* Annual Average expressed as a Geometric Mean

SUSPENDED PARTICULATE
(ug/m3)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-30	31-60	61-90	91-120	120+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	0	2	3	0	0	5	59.7
FEB	2	2	0	0	0	4	31.1
MAR	3	1	1	0	0	5	31.0
APR	0	2	2	1	0	5	62.9
MAY	0	2	2	0	1	5	68.2
JUNE	0	2	3	0	0	5	53.2
JULY	0	1	0	2	0	3	76.0
AUG	0	0	0	0	0	0	0.0
SEPT	0	0	0	0	0	0	0.0
OCT	0	0	0	0	0	0	0.0
NOV	0	0	0	0	0	0	0.0
DEC	0	0	0	0	0	0	0.0
ANNUAL	5	12	11	3	1	32	51.4

2.7

POST OFFICE

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER OF 1 HOUR EXCEEDANCES
Carbon Monoxide	76.8 ug/m^3	0
Nitrogen Dioxide	36.7 ug/m^3	0
Ozone	47.2 ug/m^3	16
Sulphur Dioxide	14.0 ug/m^3	0
Total Suspended Lead	0.02 ug/m^3	N/A
Total Suspended Particulate	39.98 ug/m^3*	0
Total Suspended Sulphate	3.93 ug/m^3*	N/A

* Annual Average expressed as a Geometric Mean

POST OFFICE

CARBON MONOXIDE
(PPM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-01	02-06	07-12	13-35	36+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	565	176	3	0	0	744	1.0
FEB	595	75	5	0	0	670	0.9
MAR	554	171	0	0	0	725	1.1
APR	320	66	0	0	0	386	0.8
MAY	641	29	0	0	0	670	0.6
JUNE	447	24	0	0	0	471	0.6
JULY	604	25	0	0	0	629	0.4
AUG	711	33	0	0	0	744	0.4
SEPT	646	41	1	0	0	688	0.4
OCT	687	55	2	0	0	744	0.4
NOV	648	64	1	0	0	713	0.5
DEC	525	74	1	0	0	600	0.7
ANNUAL	6952	818	7	0	0	7777	0.6

POST OFFICE

NITROGEN DIOXIDE
(PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-02	03-05	06-10	11-21	22+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	483	257	4	0	0	744	2.1
FEB	566	102	4	0	0	672	1.4
MAR	428	277	20	0	0	725	2.5
APR	378	131	16	2	0	527	1.9
MAY	518	194	17	0	0	729	2.0
JUNE	297	154	20	0	0	471	2.2
JULY	413	284	46	0	0	743	2.6
AUG	478	220	45	1	0	744	2.2
SEPT	560	108	20	0	0	688	1.4
OCT	455	97	23	5	0	580	1.8
NOV	593	112	14	0	0	719	1.4
DEC	595	117	27	5	0	744	1.7
ANNUAL	5764	2053	256	13	0	3086	1.9

POST OFFICE

OZONE
(PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-01	02-05	06-08	09-12	13+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	263	436	0	0	0	699	1.8
FEB	97	570	0	0	0	667	2.6
MAR	297	423	6	0	0	726	1.9
APR	75	447	6	0	0	528	2.8
MAY	92	627	18	0	0	737	3.1
JUNE	49	367	46	9	0	471	3.4
JULY	232	511	0	0	0	743	2.1
AUG	230	475	33	6	0	744	2.3
SEPT	235	429	23	1	0	688	2.3
OCT	198	543	2	0	0	743	2.3
NOV	318	398	3	0	0	719	1.8
DEC	233	511	0	0	0	744	2.0
ANNUAL	2319	5737	137	16	0	8209	2.3

POST OFFICE

SULPHUR DIOXIDE
(PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-02	03-11	12-17	18-34	35+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	541	70	0	0	0	611	1.1
FEB	650	20	0	0	0	670	0.7
MAR	672	53	0	0	0	725	1.2
APR	512	15	0	0	0	527	0.5
MAY	705	9	0	0	0	714	0.2
JUNE	468	3	0	0	0	471	0.1
JULY	741	2	0	0	0	743	0.2
AUG	735	9	0	0	0	744	0.3
SEPT	685	3	0	0	0	688	0.1
OCT	728	16	0	0	0	744	0.5
NOV	683	12	0	0	0	695	0.5
DEC	676	37	0	0	0	713	0.9
ANNUAL	7796	249	0	0	0	8045	0.5

PROVINCIAL BUILDING

SUSPENDED PARTICULATE
(ug/m^3)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-30	31-60	61-90	91-120	120+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	0	1	2	1	0	4	73.9
FEB	0	5	0	0	0	5	34.9
MAR	4	0	0	1	0	5	24.9
APR	0	4	0	1	0	5	56.2
MAY	0	5	0	0	0	5	40.1
JUNE	1	4	0	0	0	5	33.9
JULY	0	5	0	0	0	5	37.7
AUG	1	5	0	0	0	6	31.1
SEPT	1	1	0	0	0	2	28.5
OCT	1	4	0	0	0	5	37.6
NOV	0	2	1	0	0	3	46.8
DEC	0	4	1	0	0	5	58.5
ANNUAL	8	40	4	3	0	55	39.9

2.8

REGIONAL CENTER

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER OF 1 HOUR EXCEEDANCES
Hydrogen Sulphide	8.1 ug/m^3	312
Total Suspended Lead	0.01 ug/m^3*	N/A
Total Suspended Particulate	68.3 ug/m^3*	0
Total Suspended Sulphate	4.47 ug/m^3*	N/A

* Annual Average expressed as a Geometric mean.

HYDROGEN SULPHIDE (PPHM)

*** FREQUENCY DISTRIBUTION ***

MONTH	0	01	02-05	06-10	11+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	569	67	70	52	0	711	0.4
FEB	342	114	142	17	0	615	0.9
MAR	601	56	22	4	0	683	0.2
APR	437	30	11	1	0	479	0.1
SEPT	168	90	28	5	0	291	0.7
OCT	25	68	1	4	2	100	1.3
ANNUAL	2142	425	274	36	2	2879	0.5

REGIONAL CENTER

SUSPENDED PARTICULATE
(ug/m^3)

FREQUENCY DISTRIBUTION

MONTH	0-30	31-60	61-90	91-120	120+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	0	0	0	0	0	0	
FEB	0	0	0	0	0	0	
MAR	0	0	0	0	0	0	
APR	0	0	0	0	0	0	
MAY	0	0	0	0	0	0	
JUNE	0	0	0	0	0	0	
JULY	0	0	0	0	0	0	
AUG	0	0	0	0	0	0	
SEPT	0	0	0	0	0	0	
OCT	0	0	0	0	0	0	
NOV	0	0	0	0	0	0	
DEC	0	1	3	1	0	5	68.3
ANNUAL	0	1	3	1	0	5	68.3

2.9

WESTERN DISTRICT POLICE STATION

SUMMARY

PARAMETER	ANNUAL AVERAGE	NUMBER 1 HOUR EXCEEDANCES
Total Suspended Lead	0.02 ug/m^3	N/A
Total Suspended Particulate	24.20 ug/m^3	0
Total Suspended Sulphate	2.30 ug/m^3	N/A

* Annual Average expressed as a Geometric Mean

WESTERN DISTRICT POLICE STATION

SUSPENDED PARTICULATE
(ug/m^3)

*** FREQUENCY DISTRIBUTION ***

MONTH	0-30	31-60	61-90	91-120	120+	NO.OF SAMPLES	MONTHLY AVERAGE
JAN	2	2	0	0	0	4	31.3
FEB	4	1	0	0	0	5	22.2
MAR	4	1	0	0	0	5	16.6
APR	4	0	0	0	0	4	17.9
MAY	2	3	0	0	0	5	33.3
JUNE	5	0	0	0	0	5	23.2
JULY	5	0	0	0	0	5	18.2
AUG	6	1	0	0	0	6	17.6
SEPT	4	1	0	0	0	5	18.2
OCT	2	3	0	0	0	5	28.8
NOV	0	3	2	0	0	5	52.0
DEC	1	2	0	0	0	3	34.6
ANNUAL	39	16	2	0	0	57	24.2

3.

CULMULATIVE RECORD OF ANNUAL CONCENTRATIONS

3.1

SULPHUR DIOXIDE

(ug/m^3)

YEAR	POLICE STATN	MILL'G VILLE	POST OFFICE	RED HEAD	FOREST HILLS	CHAMPL'N HEIGHTS	DEMONTS STREET	SILVER FALLS
1975	2.1	20.8	34.1	16.7	-	-	-	-
1976	3.8	20.2	38.8	15.7	27.5	-	-	-
1977	4.4	20.6	42.7	21.4	48.6	27.6	56.0	-
1978	9.2	13.4	19.0	17.7	40.1	35.7	35.4	-
1979	7.7	17.4	48.4	13.3	38.7	34.2	33.1	-
1980	19.3	16.9	34.0	8.0	54.0	42.0	25.4	-
1981	15.9	15.0	39.2	13.2	44.4	48.5	-	-
1982	13.3	16.5	17.4	16.4	47.7	27.4	12.2	-
1983	10.6	13.3	15.9	8.0	34.5	21.2	10.6	18.6
1984	10.6	8.0	18.6	5.3	29.2	10.6	15.9	21.2
1985	-	-	29.2	-	23.9	15.9	-	-
1986	-	-	20.4	-	22.7	25.7	-	-
1987	-	-	14.0	-	19.9	14.6	-	-

NOTE: The Provincial Annual Average Standard for Sulphur Dioxide is 60 ug/m^3.

3.2

CUMULATIVE RECORD OF ANNUAL CONCENTRATIONS

TOTAL SUSPENDED PARTICULATES / SULPHATE

(ug/m^3)

YEAR	W.D. POLICE STATION		MILL'G VILLE		RED HEAD		PROVINCIAL BUILDING		FOREST HILLS	
	TSP	SO_4	TSP	SO_4	TSP	SO_4	TSP	SO_4	TSP	SO_4
1975	36.7	-	52.6	-	31.2	-	51.7	-	-	-
1976	36.8	-	55.8	-	28.1	-	49.4	-	51.0	-
1977	32.8	-	44.3	-	27.9	-	63.0	-	43.6	-
1978	38.2	2.3	54.9	-	30.6	4.1	56.8	5.7	53.2	-
1979	36.9	1.3	50.1	-	28.6	2.1	58.3	4.1	38.1	-
1980	38.0	2.3	54.8	-	35.8	2.9	68.8	6.2	43.3	-
1981	30.5	1.66	38.5	-	32.7	2.52	57.2	3.89	38.5	-
1982	33.6	2.39	41.3	-	29.9	2.74	58.7	4.95	43.3	-
1983	26.5	2.18	38.8	3.20	23.8	3.54	39.7	4.11	45.6	4.26
1984	24.1	2.54	32.8	3.47	19.3	3.19	33.1	4.43	33.7	3.20
1985	21.2	2.25	35.1	3.27	23.1	3.59	36.5	4.66	36.1	3.70
1986	20.9	2.19	34.0	2.75	-	-	38.4	4.25	35.3	3.23
1987	24.2	2.30	51.4	3.89	-	-	39.9	3.93	45.6	3.60

NOTE: The Provincial Annual Average Standard for Total Suspended Particulate is 70 ug/m^3. No standard has yet been adopted for Sulphate.

3.3

CUMULATIVE RECORD OF ANNUAL CONCENTRATIONS

	Carbon Monoxide (ug/m^3)		Hydrogen Sulphide (ug/m^3)		Nitrogen Dioxide (ug/m^3)	
Year	Post Office	Forest Hills	DeMonts Street	Mill'g ville	Post Office	Forest Hills
1975	-	-	-	-	-	-
1976	-	-	-	-	-	-
1977	-	1510	-	-	-	19.6
1978	-	720	6.6	-	-	13.5
1979	-	650	4.8	-	-	16.9
1980	811	746	9.1	-	5.7	13.5
1981	397	464	0.6	-	31.0	-
1982	695	495	2.3	-	28.5	38.6
1983	680	1200	4.2	1.4	22.8	49.4
1984	1440	1080	2.8	-	22.8	11.4
1985	600	-	-	-	22.8	20.9
1986	776	-	3.5	-	22.2	19.9
1987	768	-	8.1	-	36.7	19.6

NOTE: Provincial Annual Average Standards have not been adopted for Carbon Monoxide or Hydrogen Sulphide. The standard for Nitrogen Dioxide is 100 ug/m^3.

3.4

CUMULATIVE RECORD OF ANNUAL CONCENTRATIONS

Year	OZONE (ug/m^3)			DUSTFALL (ug/m^3)			
	Post Office	Forest Hills	Police Station	Brookville Road	Hill	Bishops	Provincial Hospital
1975	-	-	-	-	-	-	8.1
1976	-	-	-	10.3	11.8	24.6	9.2
1977	-	76.3	-	4.5	8.2	11.2	9.1
1978	-	63.3	-	11.0	9.0	16.1	13.0
1979	-	-	-	5.2	8.9	13.9	8.2
1980	4.7	52.5	46.5	5.1	17.4	21.3	11.6
1981	35.2	45.2	-	7.1	13.9	15.3	14.1
1982	44.5	43.3	-	5.6	5.0	-	7.3
1983	46.0	44.0	48.0	-	-	-	-
1984	44.0	78.0	-	-	-	-	-
1985	40.0	60.0	-	-	-	-	-
1986	41.8	57.5	-	-	-	-	-
1987	47.2	45.2	-	-	-	-	-

3.5

CUMULATIVE RECORD OF ANNUAL CONCENTRATIONS

SULPHATION RATE

($mg/so^3/100cm^2/day$)

Year	Provincial Hospital	Musquash Road	Provincial Building	Red Head	Ludgate Lake	Rockwood Park
1974	1.89	-	-	0.62	-	-
1975	2.46	-	-	1.22	-	-
1976	1.62	0.31	1.09	0.42	0.25	0.51
1977	1.45	0.26	1.43	0.45	0.26	0.50
1978	1.83	0.41	1.04	0.46	0.52	0.55
1979	3.91	0.37	1.39	0.79	0.45	0.59
1980	1.44	0.13	0.79	0.36	0.20	0.47
1981	1.48	0.22	0.90	0.36	0.24	0.51
1982	-	0.21	1.02	0.35	0.24	0.52
1983	1.36	-	0.75	0.33	-	-

Year	Bloomsb. Mountain	Shadow Lake	Canaport	Forest Hills	DeMonts Street	Mill'g ville
1976	0.31	0.15	-	-	-	0.62
1977	0.25	0.30	-	0.75	0.65	0.42
1978	0.46	0.16	-	1.21	0.81	0.78
1979	0.43	0.50	0.49	0.74	1.02	0.53
1980	0.17	0.20	0.27	0.55	0.49	0.43
1981	0.17	0.19	0.27	0.66	0.48	0.32
1982	0.25	0.29	0.32	0.74	0.55	0.39
1983	-	-	-	0.66	0.47	0.39

NOTE: Sulphation Rate monitoring was discontinued in 1983.

3.6

CUMULATIVE RECORD OF ANNUAL CONCENTRATIONS

TOTAL SUSPENDED LEAD

(ug/m^3)

(Geometric Means)

YEAR	Forest Hills	Red Head	Provincial Building	Mill'g -ville	Police Station	Fredericton Fire Station
1974	-	0.08	-	0.24	0.44	-
1975	-	0.11	0.46	0.33	0.41	0.76
1976	0.25	0.06	0.31	0.23	0.18	0.55
1977	0.18	0.04	0.23	0.12	0.14	0.42
1978	0.17	0.07	0.20	0.18	0.12	0.34
1979	0.18	0.04	0.21	0.19	0.11	0.39
1980	0.26	0.03	0.19	0.26	0.10	0.34
1981	0.24	0.05	0.20	0.21	0.11	0.34
1982	0.21	0.05	0.17	0.19	0.11	0.29
1983	0.15	0.03	0.12	0.11	0.08	0.24
1984	0.11	0.05	0.11	0.10	0.09	0.17
1985	0.14	0.10	0.12	0.12	0.10	0.16
1986	0.10	-	0.11	0.08	0.08	0.13
1987	0.02	-	0.02	0.03	0.02	0.03

4.1

ACIDIC PRECIPITATION DATA

General

The following tables present annual averages for a number of parameters measured in the local Acidic Deposition Study. Stations were established in late 1984 at Forest Hills ,Musquash, Lonewater Farm and Darlings Island. Tables having the frequency distribution of daily total suspended particulate observations for the latter three sites are also included. The Forest Hills station was discontined in early 1987 due to siting problems.

Data for 1985 - 1987 is presented on Summary Tables for each station at the beginning of each of the following subsections of this chapter.

The number of samples taken should be noted before drawing any conclusions regarding monthly or annual averages. These averages are calculated based on all samples taken with no minimum number specified.

4.2

DARLING'S ISLAND

SUMMARY

PARAMETER / YEAR	1985	1986	1987
Total Suspended Particulate (ug/m^3)*	N/A	17.7	19.2
Total Suspended Sulphate (ug/m^3)*	N/A	2.22	2.17
Total Precipitation (mm)	1111.6	1117.8	997.5
pH	4.28	4.44	4.65
Total Sulphate (Kg/ha/yr)	15.8	24.3	15.2
Excess Sulphate (Kg/ha/yr)	14.8	23.7	14.3
Total Nitrate (Kg/ha/yr)	9.42	15.8	7.5

* Annual average expressed as a Geometric Mean.

SUSPENDED PARTICULATE

(ug/m^3)

*** FREQUENCY DISTRIBUTION ***

Month	0-3	31-60	61-90	91-20	120+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN	2	3	0	0	0	5	30.6
FEB	5	0	0	0	0	5	8.7
MAR	4	1	0	0	0	5	20.0
APR	4	1	0	0	0	5	15.1
MAY	5	0	0	0	0	5	22.5
JUNE	1	0	0	0	0	1	9.1
JULY	3	1	0	0	0	4	24.9
AUG	5	1	0	0	0	6	19.9
SEPT	4	1	0	0	0	5	22.2
OCT	4	0	0	0	0	4	8.0
NOV	0	3	0	0	0	3	39.0
DEC	3	2	0	0	0	5	28.7
ANNUAL	40	13	0	0	0	53	19.2

4.3

FOREST HILLS

SUMMARY

PARAMETER / YEAR	1985	1986	1987
Total Precipitation (mm)	1005.9	N/A	N.A.
pH	4.35	4.48	N.A.
Total Sulphate (Kg/ha/yr)	40.2	35.3	N.A.
Excess Sulphate (Kg/ha/yr)	36.7	31.2	N.A.
Total Nitrate (Kg/ha/yr) (as NO^3)	12.1	13.6	N.A.

Note: This Station was discontinued in early 1987.

4.4

LONEWATER FARM

SUMMARY

PARAMETER / YEAR	1985	1986	1987
Total Suspended Particulate (ug/m^3)*	N/A	19.1	19.7
Total Suspended Sulphate (ug/m^3)*	N/A	2.02	1.65
Total Precipitation (mm)	789.22	1026.6	1056.9
pH	4.32	4.49	4.82
Total Sulphate (Kg/ha/yr)	13.6	22.3	15.3
Excess Sulphate (Kg/ha/yr)	13.3	21.0	13.9
Total Nitrate (Kg/ha/yr) (as NO^3)	9.8	10.2	5.1

* Annual average expressed as a Geometric Mean.

SUSPENDED PARTICULATE

(ug/m^3)

*** Frequency Distribution ***

Month	0-30	31-60	61-90	91-20	120+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN	1	3	0	0	0	4	35.7
FEB	4	0	0	0	0	4	8.4
MAR	3	0	0	0	0	3	15.2
APR	1	0	0	0	0	1	8.4
MAY	0	0	0	0	0	0	0.0
JUNE	2	0	0	0	0	2	17.0
JULY	5	0	0	0	0	5	15.3
AUG	4	1	0	0	0	5	18.7
SEPT	0	1	0	0	0	1	50.9
OCT	2	2	0	0	0	4	17.2
NOV	0	2	0	0	0	2	37.8
DEC	0	4	0	0	0	4	39.4
ANNUAL	22	13	0	0	0	35	19.7

4.5

MUSQUASH

SUMMARY

PARAMETER / YEAR	1985	1986	1987
Total Suspended Particulate (ug/m^3)*	N/A	14.9	15.7
Total Suspended Sulphate (ug/m^3)*	N/A	2.20	1.83
Total Precipitation (mm)	1212.8	1168.2	1199.0
pH	4.29	4.49	4.59
Total Sulphate (Kg/ha/yr)	25.2	27.0	21.7
Excess Sulphate (Kg/ha/yr)	22.7	24.4	19.7
Total Nitrate (Kg/ha/yr) (as NO^3)	16.0	12.4	10.9

* Annual Average expressed as a Geometic Mean.

SUSPENDED PARTICULATE
(ug/m^3)

*** FREQUENCY DISTRIBUTION ***

Month	0-30	31-60	61-90	91-120	120+	NO. OF SAMPLES	MONTHLY AVERAGE
JAN	3	1	0	0	0	4	28.5
FEB	4	0	0	0	0	4	10.4
MAR	5	0	0	0	0	5	12.7
APR	5	0	0	0	0	5	14.7
MAY	3	1	0	0	0	4	22.9
JUNE	5	0	0	0	0	5	19.1
JULY	2	0	0	0	0	2	20.6
AUG	6	0	0	0	0	6	11.5
SEPT	3	0	0	0	0	3	11.9
OCT	4	0	0	0	0	4	7.6
NOV	3	1	0	0	0	4	28.4
DEC	3	0	0	0	0	3	21.3
ANNUAL	46	3	0	0	0	49	15.7

5.

DISCUSSION OF RESULTS

The long term air quality objectives as set out by the Federal Guidelines and Provincial Regulations are consistently being met in Saint John.

There were no exceedances of the Provincial One Hour Standard at any of the three stations measuring sulphur dioxide in 1986 or 1987. Annual averages were well below the Provincial Standard and levels showed a decrease at all three stations over the previous year. The highest annual average was recorded at Forest Hills. The continued general decreases in sulphur dioxide concentrations can be at least partially attributed to relatively low capacity factors at the Coleson Cove and Courtenay Bay Thermal Generating Stations and low emission rates from the Irving Oil Refinery. The Hog Fuel Boiler at Irving Pulp and Paper Ltd. completed two full years of operation, reducing emissions from fuel oil burning at this source.

There were no exceedances of the Provincial One Hour Standard for carbon monoxide. The annual average at the Post Office decreased slightly from the previous year.

There were no exceedances of the Provincial One Hour Standard at either of the two stations monitoring nitrogen dioxide. The annual average increased at the Post Office Station over the previous year while the Forest Hills Station remained the same.

There were sixteen exceedances of the Federal Ambient Air Quality Objectives for ozone at the two full time monitoring stations, a significant increase from the previous year. The annual average increased at the Post Office and decreased at the Forest Hills Station. The highest annual average was recorded at the Post Office Station. The major contribution to ozone concentration appears to be from long range transport.

The significant difference in annual levels between the two stations in previous years was not evident in 1987. The annual average for both stations were similar. In addition, there were three exceedances of the Federal Air Quality Objectives for ozone at two seasonal monitoring stations at Lepreau and Central Blissville. Because of the seasonal nature of these stations no comparisons were made.

Annual Averages for T.S.P. at all locations were below the Provincial Standard. Millidgeville recorded the highest annual average. There was one exceedance of the Provincial Twenty-Four Hour Standard recorded at both the Millidgeville site and Forest Hills, two of four stations monitoring this pollutant. This is an increase from one exceedance measured in 1986. There was an increase in the annual averages for T.S.P. at all four stations. These four locations measured sulphate and lead in conjunction with T.S.P. The highest annual average sulphate levels continued to be recorded at the Provincial Building. The highest annual average of lead was recorded at the Millidgeville Station. Lead levels have dropped considerably with the continued decrease in the use of leaded gasoline.

Ambient air quality data has always been an important part of any airshed management program. It has served as the primary indicator of the success of control programs. However, in addition to the concentration of pollutants in the air, another indicator has become equally as important. This indicator is the rate of deposition of pollutants onto our soils and waters. While long recognized as important, this indicator has suffered lack of attention due to difficulties in making accurate measurements. Techniques now available include precipitation sampling and moss or lichen studies. Because of the high sensitivity of the environment to the west of Saint John to inputs of acidic pollutants, special studies are being carried out to measure this deposition.

Annual precipitation parameters are measured at four locations in the Saint John Region. The annual pH of rainwater increased at the Darlings Island, Lonewater and Musquash stations. The lowest pH value continues to be measured at the Darling's Island site. Both the total sulphate and excess sulphate deposition rates decreased at all the sites. The highest excess sulphate deposition rate was at the Musquash site.

APPENDIX A

A.1

REGULATIONS AND GUIDELINES
GROUND LEVEL AIR QUALITY

NEW BRUNSWICK REGULATION

Contaminant	1 Hr.	8 Hr.	24 Hr.	Annual
Carbon Monoxide	35,000	15,000	-	-
Hydrogen Sulphide	15	-	5	-
Nitrogen Dioxide	400	-	200	100
Sulphur Dioxide	900	-	300	60
Total Suspended Particulate	-	-	120	70

FEDERAL ACCEPTABLE GUIDELINE

Contaminant	1 Hr.	24 Hr.	Annual
Ozone	160	50	30

REGULATIONS/GUIDELINES FROM OTHER PROVINCES (ONTARIO)

Contaminant	1 Hr.	24 Hr.	Annual
Dustfall	-	7 gm/m^2	4.6 gm/m^2
Lead	5	2	

NOTE: All values in micrograms per cubic meter unless otherwise stated.

A.2

ABBREVIATIONS

The following is a list of abbreviations and notations used in this report.

pphm - parts per hundred million
ppm - parts per million
ug/m^3 - micrograms per cubic meter
N/A - data not available

A.3

CONVERSION TO METRIC UNITS

The units of measurement used in the monthly reports were converted to metric units for presentation of annual averages. The conversion factors used were:

SO_2	1 pphm = 26.5 ug/m^3
CO	1 ppm = 1200 ug/m^3
NO_2	1 pphm = 19 ug/m^3
O_3	1 pphm = 20 ug/m^3
H_2S	1 pphm = 14 ug/m^3
DUST	1 $ton/mile^2/month$ = 350.5 $mg/m^2/month$

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